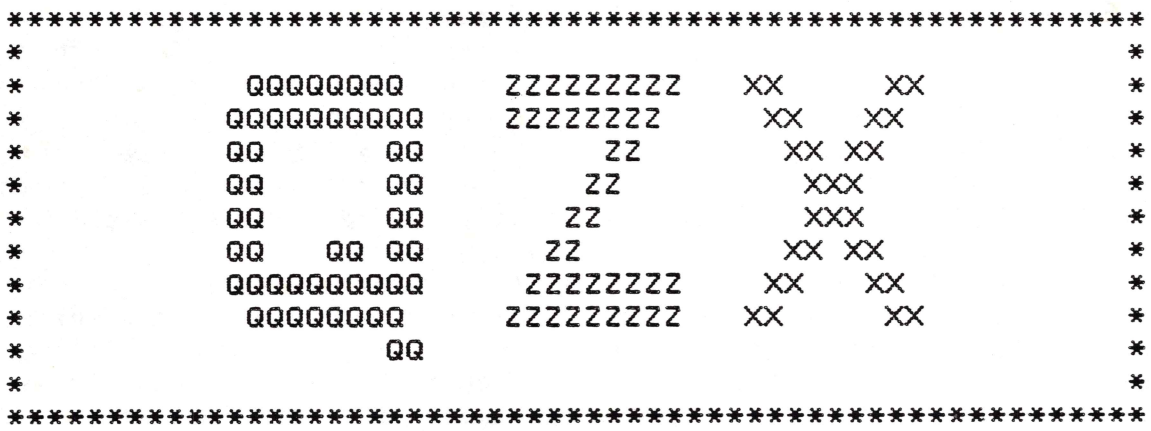
QQQQQQQ ZZZZZZZZZ XX XX
QQQQQQQQQQ ZZZZZZZZ XX XX
QQ QQ ZZ XX XX
QQ QQ ZZ XXX
QQ QQ ZZ XXX
QQ QQ QQ ZZ XX XX
QQQQQQQQQQ ZZZZZZZZ XX XX
QQQQQQQ ZZZZZZZZZ XX XX
QQ

The Journal Covering Amateur Radio & Sinclair Computers
ZX80; Micro-Ace; ZX81; TS1000, 1500, & 2068; QL; Z88
Alex. F. Burr, K5XY, Publisher
2025 O'Donnell Drive
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88001

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EDITOR'S NOTES

K5XY

The unclassified ads in QZX really get results (if the price is right). Bo Barry has been cleaning out his house and offered some T/S goodies for the postage in last month's unclassified ads. He had one telephone call before he even got the issue himself and two letters which arrived with his issue. Almost everything is gone now.

This issue is late, I know. Thigns have been pretty busy around here. One of my daughters got married in June and the house had to be renovated a bit. I also injured my knee and had to go to a conference in California. This issue is being put out in the short time between my return from that conference and my leaving to spend part of this month at Argonne National Laboratory revising a lab book for the International Atomic Energy Agency. The next issue will go out as soon as I get back.

In the mean time, I am having to decide on an A to D converter computer combination for the laboratories at the physics department at New Mexico State University. That is one of the reasons I wrote the reviews of the A to D converter for the QL which continues in this issue. That converter is certainly inexpensive compared to some that I am looking at for the school. It does not have enough software written for it to qualify for my work project. Of course software can be easily written for it, as you will see next month; but nobody here has the time to write the extensive software which will be required for the undergraduates at NMSU. Because they are not sophisticated computer users, special attention has to be paid to making it user friendly with fancy screens. The QL would be good for this type of use with its easily established windows and colorful screens, all at an inexpensive price. The school will pay for software that is already written. They will also permit me to write software; but, since they already pay me, they think I should write it in my spare time, which they will not give me.

If anybody has suggestions for inexpensive good A to D converters with inexpensive software, let me know. The combination should be easy to program, be very flexible, and support x vx y plotting.

Now for some useful addresses thanks to WA6DLI and WA4BQE. The new librarian for QUANTA (the QL Users and Tinkerers Association) is

Mr. Rick Bazan
28 Windsor Place
Nutley, NJ 07110.

Some of you have noted that used Sinclair computers were being sold at the Computer Fest. These items are becoming harder to find. Try the following address.

Eric Johnson
249 North Harden Ave.
Orange City, FL 327863
(904) 775-4935.

QL DATA INTERFACE 3

K5XY

This article is a continuation of the articles, QL Data Interface 1 and 2 from past issues, about the Prairie Digital Data Acquisition System for the QL. There was no article last month because there were more timely articles to print, but the article the month before last told something about the actual circuit itself and how it worked. This month, the article will give actual results of tests on the board. Complete tests were not run because the time was not available, but the results on the A to D converter I did

get were very good indeed.

I have been testing some complicated MSDOS A to D converters with fancy software at work, and I have had nothing but trouble. First dip switches were incorrectly set, then disk drives would not read disks, and so on the list of difficulties goes. Thus it was with some apprehension that I soldered two leads to the board, inserted it carefully into my QL, and connected a battery as a voltage source.

It was a great feeling to watch a string of 1.52's climb up the nonitor screen on the first try. The A to D card was working and giving reasonable answers for the C cell I was using as the voltage source. Of course, the board (and the software) is not complicated, but still it was a great relief to have everything work correctly on the first try.

Now were the readings I got accurate? Remember I had said last month that the voltage reference circuit on the board cut a few corners. The 1.52 V was reasonable for an old but unused battery. To check, I used a Fluke digital voltmeter. Its reading on the same battery was 1.518 V. Not bad. In fact, it could not be better. I tried another voltage. The Fluke read 3.94 V. The string of numbers on the screen of the QL from the A to D converter board read 3.96, 3.92 and every number in between. Notice that the average (and most frequent reading) was 3.94 V. Here I was using a cheap AC power supply to provide the test signal and the A to D converter was reading (about 3 times each second) the instantenious voltage, ripple and all. A final test with a 5.00 volt signal produced a reading of 4.98 V. Notice that there is less than a 1/2 % difference in this case, very good indeed for an inexpensive board.

An A to D board makes a very good project because it combines a learning experience with hardware and software. I have said nothing about the software as yet. It need not be unusually complicated, but it is not your routine BASIC program. Tune in next month for details of the software used to make these tests.

QZX FRIENDS

K7FG -- Ferdinand says that he appreciates the contributions of WA6DLI and the comments and answers Bob gives to individual questions.

WA4BQE -- Ed visited Las Cruces recently. I had a fine eyeball QSO with him. He also got in a visit with KF5GG, a local QZX subscriber. Ed is really collecting up computers and is always on the look out for unusual Sinclair items to add to his growing collection.

DATES
K5XY

Nobody has commented upon the subtle change that took place in the masthead of QZX between the issue of August 1988 and the issue of 1988 September. I really did not expect anybody to do so, because the only change was in the positioning of the year (1988) with respect to the month (as illustrated above). But the difference does represent a change that has significance for hams.

The reason for the change was reinforced last week when I received a large batch of QSL cards from a bureau. Some were for contacts made three years ago, many others were for contacts over six months old. Mow when the date is written as 04/10/88 where do you look in your log to confirm the contact? Do you look under April or October? In the United States most people put the month first so you would look under the 10th of April. However, almost all of the rest of the world puts the day first, so you would look under the 4th of October. To make matters more confusing, the US military uses the method favored by the rest of the world. (Out of 15 cards from the US selected at random 9 placed the month first while 6 placed the day first.)

For some time I have folowed the convention of using letters to represent the months. I even developed a set of two letter abreviations to use as shown in the following table.

Month	#	Abr	Month	#	Abr
January	01	JA	July	07	JL
February	02	F	August	08	AG
March	03	MR	September	09	S
April	04	AP	October	10	O
May	05	MY	November	11	N
June	06	JE	December	12	D

With this scheme, it does not make any difference whether you put the day before or after the month. The month is clearly identifiable. The main difficulty is that nobody else uses this method.

The widespread use of computers provides a rational way of deciding the question. The date is essentially a number and most of the time the most significant part of a number is placed first. (I can think of two major exceptions to this observation, certain Roman numerals and usage in certain computer systems where numbers are expressed with the least significant byte placed first, to the confusion of generations of programers.)

The most significant part first rule would suggest that all dates should put the year (if used) first, the month next, to be followed by the day. My abreviations could still be used, but most people would probably want numbers only. Thus today's date would be written as 890128 and any computer program could recognize it as January 28, 1989.

Note that to make the best use of the bit slicing capabilities of the Sinclair Basic in our computers, you should reserve two spaces for the month and the day. Thus the leading 0 on the months before October should be explicitly written down, as should the leading 0 on the first nine days of the month. If this convention were to be universially adopted, it would be easier to write programs, such as logging and QSL printing progams, which used the date.

BCN-1000

BUILDING A BEACON

DO YOU WANT A BEACON ?

YOU DO OWN A REAL BEACON WITH THE PROJECT IN IT ARTICLE, AND YOU CAN GO INTO INTERNATIONAL BEACON NET.

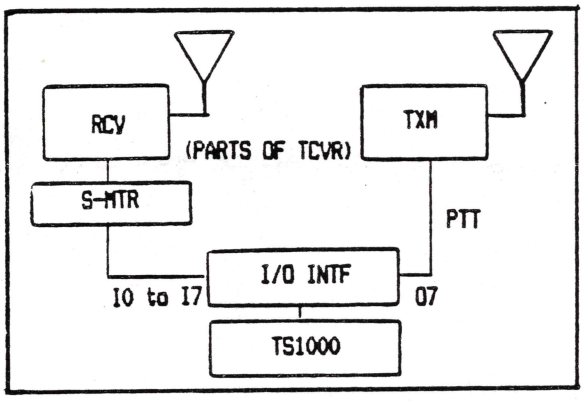
RECOGNITION MUST BE DONE TO LU1BUV * (PETER) FOR DEVELOPMENT OF BEACON-CONTROLLER CORE ROUTINE PUBLISHED IN 1985 IN AN ARGENTINE MAGAZINE.

I HAVE UPGRADED THIS SOFTWARE THAT HE HAD WRITTEN BASED ON CW SENDER.PROGRAM, AND I HAVE RELOCATED THE MESSAGES AREA AT THE END OF ROUTINE. SO YOU CAN REPLACE EASILY THOSE MESSAGES WITH YOUR CALL SIGNS, SITE AND WORK CONDITIONS.

ALSO I HAVE DESIGNED AN APPROPRIATE HARDWARE. IT REQUIRE THAT YOU USE THE PARALLEL INTERFACE OF QZX OCTOBER 1988.

IF YOU DO NOT WANT TO HAVE A BEACON, THE SOFTWARE IS STILL USEFUL FOR REPEATER CONTROLLER, RPT IDENTIFIER, Etc.

YOU CAN SEE BELOW A BLOCK DIAGRAM OF BEACON.



HOW IT WORKS

BCN-1000 SEND A SHORT MESSAGE AT REGULAR INTERVAL, LISTENING BETWEEN THEY.

AFTER SENDING 30 SHORT MESSAGES, THE BCN SEND A LONGER NESSAGE WITH BCN QTH, WORK CONDITIONS, Etc.

IF BCN LISTEN A STATION ANSWERING, THEN CONFIRM AND SEND A REPORT OF SIGNAL RECEIVED.(AS ROBOT OF RS SATELLITES BUT WITH MORE SIMPLICITY)

BCN ONLY MEASURING INTENSITY OF CARRIER SIGNAL RECEIVED, WITH THE BAR-GRAPH DISPLAY DRIVER IC (LM3914) WORKING AS A VU-METER AND DRIVING THE 74LS244 IC.

THE BCN-1000 CAN QUALIFY THE COMING SIGNAL AS: NUL, BAD, POOR, FAIR, GOOD, STRONG AND SUPERB.

IF YOU WISH, YOU CAN REPLACE CONNECTION BETWEEN PIN 1 OF SCHMITT TRIGGER 74LS14 TO PIN 12 OF LM3914 BY PIN 10 IN IT BAR-GRAPH DISPLAY DRIVER, SO THAT BCN QUALIFY SUPERB AS MUCH AS 9Db OVER PRIOR STEP IF YOU USING LM3915 (SIMILAR TO 3914 BUT IN 3Db STEP), AND WITH SOME APPROXIMATION IF USE LM3914 IC.

OF-COURSE, ALL MESSAGES THAT SEND BEACON ARE IN MORSE CODE, LIKEWISE YOU CAN TRY USE AN VOICE SYNTHESIZER AS ALLOPHONE BASED SPEECH PROCESSOR SPO256-AL2 IF YOU ABLE TO MODIFY SOFTWARE.

ALIGNMENT

YOU CAN MODIFY SOME PARAMETRS IN SOFTWARE AS SPEED OF CW TRANSMISSION, DELAYS, Etc. HOWEVER THE ONLY ALIGNMENT REQUIRED BY HARDWARE IS TO ADJUST SENSIBILITY CONTROL OF LM3914.

PROGRAM NOTES:

16514 TO 16520	PARAMETERS
16764 TO 16765	PARAMETERS
16525 TO 16760	MORSE TABLE
16765 TO 16728	SEND MESSAGE ROUTINE
16789 TO 16817	DECODE TO MORSE
16818 TO 16848	TRANSMITTER ROUTINE
16849 TO 16892	DELAYS
16893 TO 16917	KEY SCAN.
16918 TO 16968	S-METER MESSAGES
16972 TO 17097	MAIN ROUTINE
17098 TO 17148	COUNTER OF MESSAGES
17149 TO 17178	DELAY OF RECEIVER
17183 TO 17440	MESSAGES

73's AND EXCUSE ME FOR MY ENGLISH ...

LU8MAD (GUILLERMO)

SPEECHING OF TALKERS

1) TALKING OF SPEECH PROCESSOR SPO256-AL2, SOME YEARS AGO I HAVE DONE AN ALLOPHONE SPEECH SYNTHESIZER WITH THAT CHIP, BUT UNTIL NOW I HAVE NOT FINDED A USEFUL APPLICATION AT MINE SHACK.

DO YOU KNOW SOMETHING?? IF YOU DO, THEN SEND ME YOUR IDEA FOR FUTURE EXPERIMENT, AND LATER ON I SHALL GIVE CONCLUSIONS TO FELLOWS READERS OF QZX.

2) I HAVE SEEN AN ADD OF RADIO SHACK REFERENT TO VCP200 "ELECTRONIC SPEECH RECOGNITION" CHIP.

THIS HIG-TECH IC RECOGNIZES SPOKEN COMMANDS REGARDLESS OF PERSON SPEAKING WITH FIVE MOTION COMMANDS AND TWO ON/OFF COMMANDS.

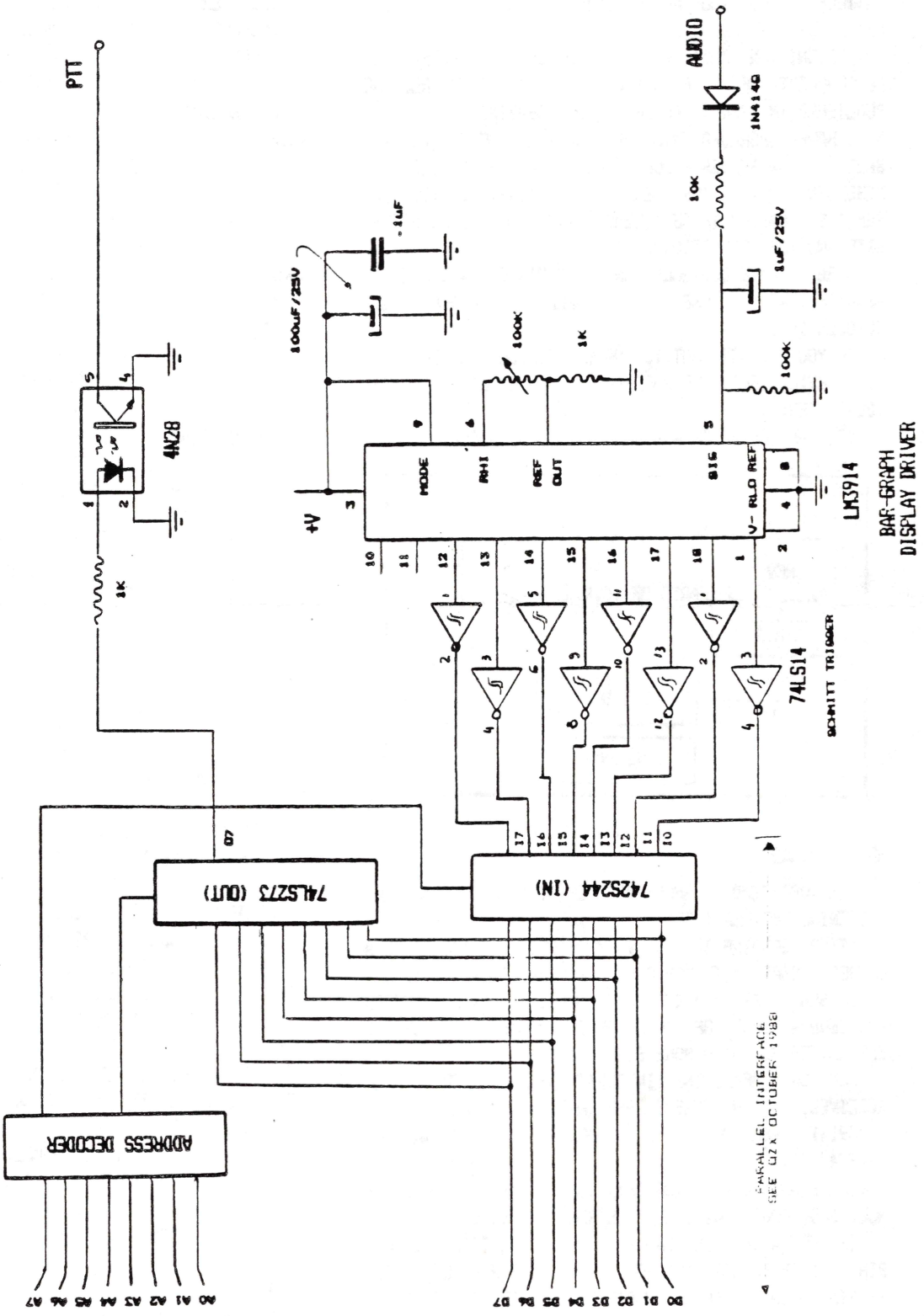
CLIPPED ANALOG INPUT SIMPLIFIER CIRCUITRY SO NO EXTERNAL A-TO-D CONVERSION IS NEED.($9.95 #276-1308)

I BELIEVE THAN USEFUL APPLICATION OF VCP200 CAN BE AS ROTATOR CONTROLLER, CAT, AND SO, AND VERY USEFUL FOR HANDICAPPED HAM.

I AM ANXIOUS FOR EXPERIMENT WITH VCP200, BUT ONLY IF SOMEBODY DONATE THAT CHIP! (HI .. HI)

NEWLY 73's LU8MAD (GUILLERMO)

BCN-1000


PTT
4N28
1K
AUDIO
1N4148
10K
1uF/25V
100K
100uF/25V
.1uF
100K
1K
+V
MODE
RHI
REF OUT
BIG
V- RLO REF
LM3914
BAR-GRAPH
DISPLAY DRIVER
74LS14
SCHMITT TRIGGER
74LS273 (OUT)
74S244 (IN)
ADDRESS DECODER
A0 A1 A2 A3 A4 A5 A6 A7
D0 D1 D2 D3 D4 D5 D6 D7
PARALLEL INTERFACE
SEE QZX OCTOBER 1988

"BCN-1000" ASSEMBLER LIST

```
16514 195 76 66    JP 16972
16517 17           COAR
16518 168          FINE
16519 9            SPEED
16520 240          CHEK
16521 30           IDCK
16522 0            NOP
16523 0            NOP
16524 0            LEV
16525 28 3 3 3 3 3  0
16531 255 0 255    SPACE
16535 29 1 3 3 3 3  1
16541 255 30 1 1 3
16546 3 3 255       2
16549 31 1 1 1 3 3  3
16555 255 32 1 1 1
16560 1 3 255       4
16563 33 1 1 1 1 1  5
16569 255 34 3 1 1  6
16574 1 1 255
16577 35 3 3 1 1 1  7
16583 255
16584 36 3 3 3 1 1  8
16590 255
16591 37 3 3 3 3 1  9
16597 255
16598 38 1 3 255    A
16602 39 3 1 1 1    B
16607 255
16608 40 3 1 3 1    C
16613 255
16614 41 3 1 1 255  D
16619 42 1 255      E
16622 43 1 1 3 1    F
16627 255
16628 44 3 3 1 255  G
16633 45 1 1 1 1
16638 255           H
16639 46 1 1 255    I
16643 47 1 3 3 3    J
16648 255
16649 48 3 1 3 255  K
16654 49 1 3 1 1    L
16659 255
16660 50 3 3 255    M
16664 51 3 1 255    N
16668 52 3 3 3 255  O
16673 53 1 3 3 1    P
16678 255
16679 54 3 3 1 3    Q
16684 255
16685 55 1 3 1 255  R
16690 56 1 1 1 255  S
16695 57 3 255      T
16698 58 1 1 3 255  U
16703 59 1 1 1 3    V
16708 255
16709 60 1 3 3 255  W
16714 61 3 1 1 3    X
16719 255
16720 62 3 1 3 3    Y
16725 255
16726 63 3 3 1 1    Z
16731 255
16732 27 3 1 1 1 3  .
16738 255
16739 15 1 1 3 3 1  ?
16746 255
16747 24 3 1 1 3 1  /
16753 255
16754 26 3 1 1 3 3  ,
16760 255
16761 254 254 254
16764 240          COUN
16765 30           IDC
16766 229          PUSH HL
16767 205 42 10    CALL 0A2A
16770 225          POP HL
16771 126          LD A,(HL)
16772 254          CP N
16723 255
16774 200          RET Z
16775 230          AND N
16776 63
16777 215          REST 16
16778 229          PUSH HL
16779 205 149 65   CALL 16789
16782 205 178 65   CALL 16818
16785 225          POP HL
16786 35           INC HL
16787 24           JP 16771
16788 238
16789 33 141 64    LD HL,16525
16792 87           LD D,A
16793 122          LD A, D
16794 190          CP (HL)
16795 40 19        JR 16816
16797 35           INC HL
16798 126          LD A (HL)
16799 254 254      CP FE
16801 40 7         JR Z 16810
16803 254 255      CP FF
16805 32 246       JR NZ 16797
16807 35           INC HL
16808 24 239       JR 16793
16810 33 99 65     LD HL,16739
16813 62 15        LD A, N
16815 201          RET
16816 126          LD A,(HL)
16817 201          RET
16818 87           LD D,A
16819 35           INC HL
16820 126          LD A(HL)
16821 254 255      CP FF
16823 40 18        JR Z 16843
16825 254 0        CP 0
16827 40 14        JR Z 16843
16829 87           LD D,A
16830 175          XOR A
16831 205 209 65   CALL 16849
16834 22           LD D 1
16836 175          XOR A
16837 205 230 65   CALL 16870
16840 35           INC HL
16841 24 233       JR 16820
16843 22 2         LD D, 2
16845 205 230 65   CALL 16870
16847 201          RET
16849 58 135 64    LD A,(16519)
16852 79           LD C,A
16853 30 255       LD E, 255
16855 29           DEC E
16856 245          PUSH AF
16857 175          XOR A
16858 211 243      OUT F3,A
16860 241          POP AF
16861 32 248       JR NZ, 16855
16863 13           DEC C
16864 32 243       JR NZ, 16853
16866 21           DEC D
16867 200          RET Z
16868 24 234       JR 16849
16870 58 135 64    LD A,(16519)
16873 79           LD C,A
16874 30 255       LD E, 255
16976 29           DEC E
16877 245          PUSH AF
16878 175          XOR A
16879 203 255      SET 7, A
16881 211 243      OUT F3, A
16883 241          POP AF
16884 32 246       JR NZ, 16876
16886 13           DEC C
16887 32 241       JR NZ, 16874
16889 21           DEC D
16890 200          RET Z
16891 24 233       JR 16870
16893 205 1 66     CALL 16897
16896 201          RET
16897 229          PUSH HL
16898 213          PUSH DE
16899 197          PUSH BC
16900 205 187 2    CALL 02BB
16903 62 255       LD A, 255
16905 189          CP L
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16906 40 6          JR Z 16914
16908 68            LD B, H
16909 77            LD C, L
16910 205 189 7     CALL 07BD
16913 126           LD A, (HL)
16914 193           POP BC
16915 209           POP DE
16916 225           POP HL
16917 201           RET
16918 0 51 58 49
16922 0 255         NUL
16924 0 39 38 41 0
16929 255           BAD
16930 0 53 52 52
16934 55 0 255      POOR
16937 0 43 38 46
16941 55 0 255      FAIR
16944 0 44 52 52
16948 41 0 255      GOOD
16951 0 56 57 55
16955 52 51 44 0    STRONG
16959 255
16960 0 56 58 53
16964 42 55 39 0    SUPERB
16968 255
16969 0 0 0         NOP
16972 175           XOR A
16973 203 255       SET 7, A
16975 211 243       OUT F3, A
16977 33 31 67      LD HL, 17180
16980 205 126 65    CALL 16766
16983 205 20 67     CALL 17169
16986 219 243       IN A, 243
16988 203 71        BIT 0, A
16990 32 104        JP NAZ, 17098
16992 205 252 66    CALL 17148
16995 219 243       IN A, 243
16997 203 71        BIT 0, A
16999 32 238        JR NZ, 16983
17001 50 140 64     LD (16524),A
17004 219 243       IN A, 243
17006 203 71        BIT 0,A
17008 40 250        JR Z 17004
17010 205 252 66    CALL 17148
17013 33 70 67      LD HL, 17222
17016 205 126 65    CALL 16766
17019 58 140 64     LD A,(16524)
17022 203 127       BIT 7, A
17024 40 25         JR Z 17051
17026 203 119       BIT 6, A
17028 40 26         JR Z, 17056
17030 203 111       BIT 5, A
17032 40 27         JR Z, 17061
17034 203 103       BIT 4, A
17036 40 28         JR Z, 17066
17038 203 95        BIT 3, A
17040 40 29         JR Z, 17071
17042 203 87        BIT 2, A
17044 40 30         JR Z, 17076
17046 33 22 66      LD HL, 16918
17049 24 28         JR 17079
17051 33 64 66      LD HL, 16960
17054 24 23         JR 17078
17056 33 55 66      LD HL, 16951
17059 24 18         JR 17079
17061 33 48 66      LD HL, 16944
17064 24 13         JR 17079
17066 33 41 66      LD HL, 16937
17069 24 8          JR 17079
17071 33 34 66      LD HL, 16930
17074 24 3          JR 17079
17076 33 26 66      LD HL, 16922
17079 205 126 65    CALL 16766
17082 33 88 67      LD HL, 17240
17085 205 126 65    CALL 16766
17088 6 20          LD B, 20
17090 205 20 67     CALL17172
17093 16 251        DJNZ 17090
17095 195 81 66     JP 16977
17098 205 253 65    CALL 16893
17101 254 0         CP 0
17103 200           RET Z
17104 205 252 66    CALL 17148
17107 58 124 65     LD A (16764)
17110 61            DEC A
17111 50 124 65     LD (16764), A
17114 194 90 66     JP NZ, 16986
17117 58 136 64     LD A,(16520)
17120 50 124 65     LD (16764), A
17123 58 125 65     LD A,(16765)
17126 61            DEC A
17127 50 125 65     LD (16765),A
17130 194 81 66     JP NZ, 16977
17133 58 137 64     LD A, (16521)
17136 50 125 65     LD (16765),A
17139 33 129 65     LD HL, 17269
17142 205 126 65    CALL 16766
17145 195 87 66     JP 16983
17148 197           PUSH BC
17149 205 35 15     CALL 0F23
17152 213           PUSH DE
17153 58 133 64     LD A,(16517)
17156 71            LD B, A
17157 58 134 64     LD A,(16518)
17160 79            LD C, A
17161 11            DEC BC
17162 120           LD A,B
17163 177           OR C
17164 32 251        JR NZ, 17161
17166 209           POP DE
17167 205 43 15     CALL 0F2B
17170 193           POP BC
17171 201           RET
17172 205 252 66    CALL 17148
17175 205 252 66    CALL 17148
17178 201           RET
17179 0 0 0 0       NOP
17183 0 59 59 59    V V V
17187 0 0 59 59
17191 59 0 0        V V V
17194 41 42 0       DE
17197 49 58 36 50   LU8M
17201 38 41 24 39   AD/B
17205 40 51 0       CN
17208 49 58 36 50   LU8M
17212 38 41 24 39   AD/B
17216 40 51 0       CN
17219 48 0          K
17221 255
17222 0 55 55 55    R R R
17226 0 58 55 0     UR
17230 56 46 44 56   SIGS
17234 0 38 55 42    ARE
17238 0 255
17240 0 40 58 0     CU
17244 38 44 51 0    AGN
17248 35 31 0       73
17251 41 42 0       DE
17254 49 58 36 50   LU8M
17258 38 41 24 39   AD/B
17262 40 51 0       CN
17265 56 48 0 255   SK
17269 59 59 59 0    V V V
17273 49 58 36 50   LU8M
17277 38 41 0       AD
17280 39 42 38 40   BEAC
17284 52 51 0       ON
17287 35 28 55 28   5ORO
17291 36 28 0       80
17294 50 45 63 0    MHZ
17298 50 42 51 41   MEND
17302 52 63 38 0    OZA
17306 38 55 44 42   ARGE
17310 51 57 46 51   NTIN
17314 38 0          A
17316 49 38 57 0    LAT
17320 31 30 55 37   32R9
17324 56 0          S
17326 49 52 51 0    LON
17330 34 36 55 33   68R5
17334 60 0          W
17336 53 60 55 0    PWR
17340 29 28 60 0    10W
17344 38 51 57 0    ANT
17348 44 53 27 0    GP.
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```
17352 57 55 62 0   TRY
17356 60 46 57 45  WITH
17360 0 58 55 0    UR
17364 40 38 55 55  CARR
17368 46 42 55 0   IER
17372 52 51 0      ON
17375 55 42 40 42  RECE
17379 46 59 42 0   IVE
17383 53 38 58 56  PAUS
17387 42 0         E
17389 38 51 41 0   AND
17393 60 46 49 49  WILL
17397 0 55 42 40   REC
17401 42 46 59 42  EIVE
17405 0
17406 38 58 57 52  AUTO
17410 0 55 42 53   REP
17414 52 55 57 0   ORT
17418 35 31 0      73
17421 41 42 0      DE
17424 49 58 36 50  LU8M
17428 38 41 24 39  AD/B
17432 40 51 0 48   CN K
17436 255
17437 0            NOP
17438 0            NOP
17439 0            NOP
17440 0            NOP
```

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

WANTED: Several rolls of ZX-81 thermal printer paper (silver coated). Edward L. Radtke, 1602 Woodluck Ave., Louisville, KY 40205.

FOR SALE: Book Easy-up Antennas for Radio Listeners and Hams by Edward Noll. Paperback (1988) 162 pages. Originally $16.95, now $11.00 postpaid in the US. A Sams publication. The title says it all. Alex. F. Burr, K5XY, 2025 O'Donnell, Las Cruces, NM 88001.

WANTED: RS232 interface card, prefer an already built card or kit as 2nd choice for a T/S2068 computer. Stuart L Ballinger, 11 Lown CT., Poughkeepsie, NY 12603-3321 or phone #(914) 452-2482 locally.

QZX Discount: 15% discount on all orders mentioning QZX. T & C Services (address in ad in this issue).

FOR SALE: Good looking TS1000 (but no cursor on the TV screen) with power supply, used manual, and two extra books. $6.00 + $3.00 shipping. Alex. F. Burr, K5XY, 2025 O'Donnell, Las Cruces, NM 88001.

WANTED: Serial printer interface for 2068, with software and documentation. Jim Dodrill, 4122 Wallingford Lane, Louisville, KY 40218. Ph 1-502-491-4122

WANTED: Documentation for DF mapped universal I/O port by Tom Woods. Interface board designed by J. Oliger. Software required for T/S1000 application. Edward L. Radtke, 1602 Woodluck Ave., Louisville, KY 40205.

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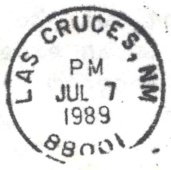

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